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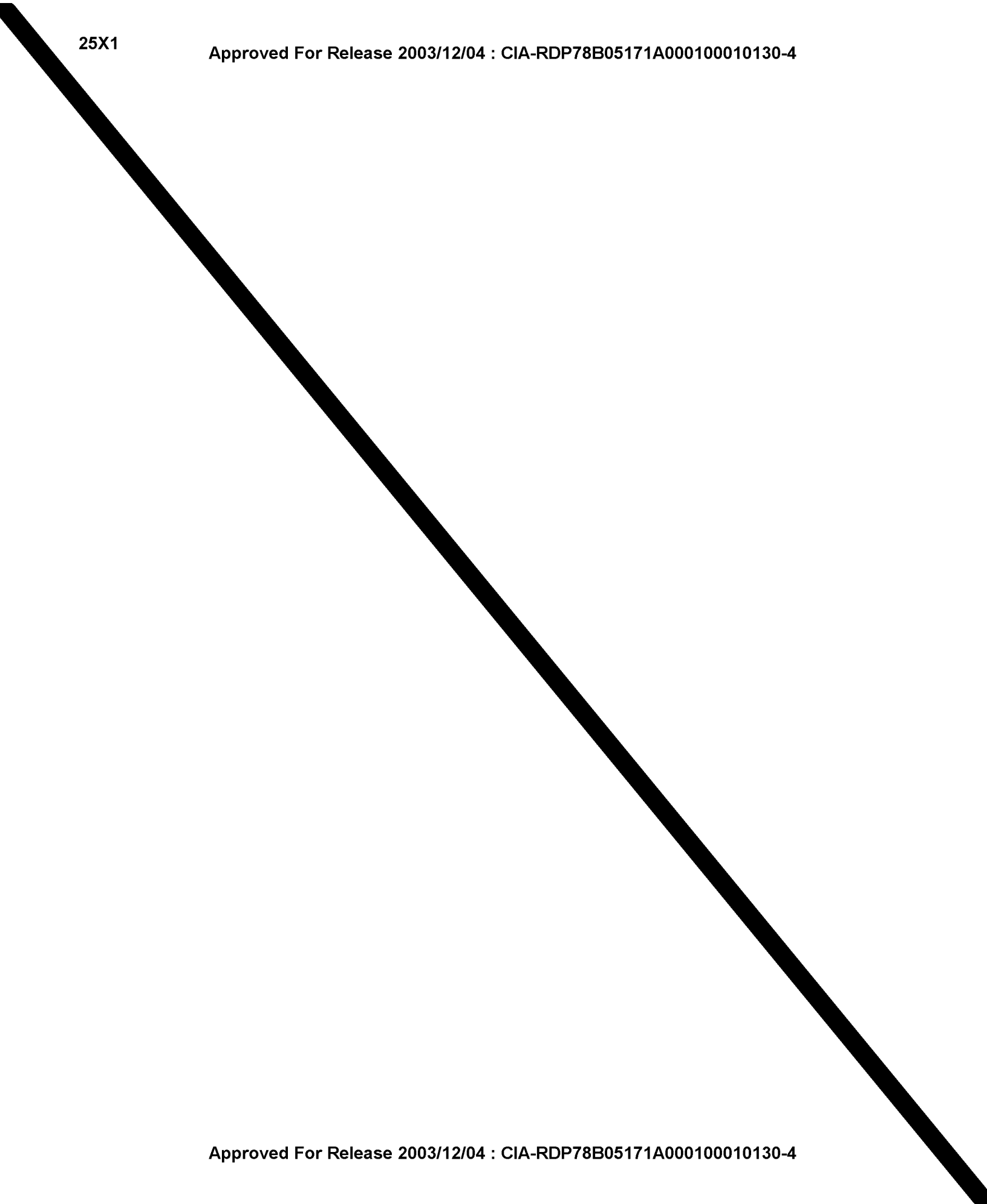

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18 July 1969

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MEMORANDUM FOR THE RECORD

Declass Review by NIMA/DOD

25X1 SUBJECT: Report on Visit

25X1 25X1 On 7-9 July 1969, Messrs. and I met with Messrs. to discuss the High Precision Stereo Comparator. The HPSC is driven by a DDP-516 computer. The primary purpose of this meeting was to determine the status of the programming for that computer.

1. STATUS

25X1 a. As has subcontracted the programming to most of our discussions were with The general philosophy used in programming this device is to split the processing capability of the 516 into a multi-programming operation. From an overall view, the HPSC software consists of the real-time foreground, real-time background, and non-real-time subsystems. The foreground computation and logic is designed to drive both stages so that stereo viewing is maintained. It is concerned with the actual commands to the stages and optics and is initiated every 8.33 milliseconds through a time based interrupt logic. This procedure is referred to as tracking. It utilizes partial derivatives that are computed in the background processing in order to compute new stage and optics positions.

b. The background processing is totally concerned with the computation of what is termed the tracking matrix. The elements of this matrix are the partial derivatives of the master stage optics, the slave stage photo coordinates, and the slave stage optics with respect to the master stage photo coordinates. About two seconds of central processor time is needed for this computation. Consequently the tracking approximation which uses the partial derivatives must be valid for at least two seconds.

c. Stage initialization and parameter acquisition comprises the non-real-time portion of the software. Data necessary for the determination of conjugate points must be entered via the teletype during initialization. A diagram of the general philosophy is attached and a table giving each element's name, a short functional description, the size, the programming language used, and the element's present status.

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The present schedule calls for the integration and testing of all the individual subprograms into a single program by mid-September. Complete acceptance testing cannot be done until the optical portion of the HPSC is ready in February 1970.

2. RESTRICTIONS

a. The present image space orientation routines are presently camera system dependent. Relationships between reference marks are maintained in the program as program constants rather than input as part of the data collection procedure. This requires a program change for a new camera system even though they are nominally the same insofar as the HPSC is concerned. No attention has yet been given to the requirements of the on-line 494 program in the area of image space orientation. In this situation the data is sent both to the 516 and the 494 and consequently the procedures must be the same.

b. There is also a speed restriction. While the device can physically move the three inches per second, present estimates indicate that anything faster than ten millimeters per second will cause loss of stereo. This is due in part to the one and one-half second lag time in the optical correlator.

c. Space restrictions on the present program limit the operator to measuring no more than 30 time ties when using strip photography. This appears to be adequate for a 20 cycle per second time track but not for a 500 cycle per second track. In light of the requirement that the DDP-516 and [redacted] 494 must have the same stage initialization procedures (fiducial points are sent to both), this implies that the 500 cps track cannot be used by the [redacted] 494.

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d. The HPSC presently requires the operator to have a true stereo pair. Specifically, for some systems he may have to measure through the base rather than measure on the emulsion. This will cause some inaccuracy in pointing and a corresponding reduction in mensuration accuracy. The suggestion was made that the problem might be resolved by interchanging the images on the two stages. This remains to be shown.

e. Because of the foreground/background programming philosophy, attention must be given to requirement for re-entrant code and self-initializing subroutines if any change to the system is made. Acceptance testing should also check this as a possible problem. Omissions of this sort are extremely difficult to catch because they cause what seems to be a random error. The error is usually not repeatable.

f. Fiducial card reference points are presently sent to the DDP-516 as part of the data acquisition phase. As all input in this phase is on a query and answer basis, the DDP requires the availability of the teletype

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to direct additional actions. Because these points are at the same time transmitted to the [redacted]494, the on-line mensuration program also requires access to the teletype so that it might echo the fiducial coordinates. Consequently the present design of the HPSC forces the [redacted] 494 to suppress the coordinate echo if only one teletype is used.

3. RECOMMENDATIONS

a. [redacted] must be directed to generalize the image space orientation subroutines so that the [redacted] may be handled without program change. NPIC must at this time insure that the image space orientation procedures used for the 516 are the same as the procedures used for the on-line 494 program. In particular the number of time tics to be measured and on which time track (500 cps or 20 cps) must be specified.

b. PHD should make tentative plans to have a KSR-35 available in the work area. This is due to the fact that both the DDP-516 and the [redacted]494 require access to the ASR-35 during image space initialization and a question arises whether the teletype switch will be adequate.

c. PHD should prepare test data for the program which includes optics settings. Present test data only provides the location of conjugate points. We should be able to estimate what the optical settings should be for these conjugate points.

d. The programming for the 516 will be complete by mid-September but will not be subjected to a final acceptance test until February of 1970. Between mid-September 1969 and February 1970, [redacted] will not be participating in the project. AID can and should review the completed programs in September to insure no unforeseen difficulties will be encountered later. The program will be demonstrable at this time.

e. NPIC personnel should learn the details of the construction of a systems tape by stepping through the procedure. This is a complex procedure involving the use of two loaders and approximately 40 subroutine tapes and must be thoroughly understood by NPIC personnel if we are ever to have the ability to change the systems tape.

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[redacted]

Chief, Applied Mathematics Branch, AID
PSG/NPIC

Attachments: a/s

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